G 3256 (Pages : 8)

ENTRANCE TEST FOR Ph.D. PROGRAMME, 2023

BIO-SCIENCE

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 1 *mark.*
Choose the correct answer from the choices given.

1. Which is a reducing sugar ?

   (A) Galactose. (B) Gluconic Acid.

   (C) Sucrose. (D) β-methyl galactosidase.

2. The meiotic division takes place in :

   (A) Meristematic cells. (B) Conductive cells.

   (C) Reproductive cells. (D) Vegetative cells.

3. The RNA and protein synthesis occurs in ———.

   (A) G2 phase. (B) M phase.

   (C) S phase. (D) G1 phase.

4. Replication of centriole occurs in ———.

   (A) Interphase. (B) Metaphase.

   (C) Anaphase. (D) Telophase.

5. Which of the following enzyme removes the RNA primer with its 5'-nuclease activity ?

   (A) DNA Polymerase III. (B) DNA Polymerase I.

   (C) DNA Polymerase II. (D) DNA Polymerase.

6. Bacteria having clusters of flagella at both poles of cells are known as ?

   (A) Amphitrichous. (B) Monotrichous.

   (C) Peritrichous. (D) Lophotrichous.

7. The respiratory chain of bacteria is associated with the ————.

(A) Cytoplasmic membrane. (B) Cell wall.

(C) Cytoplasm. (D) Mitochondrial membrane.

8. Glycolysis can occur in ————.

(A) Anaerobic cells.

(B) Aerobic cells.

(C) Neither aerobic and anaerobic cells.

(D) Both aerobic and anaerobic cells.

9. Growth of bacteria or microorganisms refer to ————.

(A) Changes in the total population.

(B) An increase in number of cells.

(C) An increase in the size of an individual organism.

(D) An increase in the mass of an individual organism.

10. Who discovered nucleic acid ?

(A) Watson and Crick. (B) Griffith.

(C) Friedrich Miescher. (D) Walter Gilbert.

11. Which bond is used to stabilize the double helix of DNA ?

(A) Hydrophobic bond. (B) Hydrogen bond.

(C) Covalent bond. (D) Ionic bond.

12. Respiration is a ————.

(A) Oxidative process. (B) Reductive process.

(c) Catabolite repression (D) Intermediate process.

13. Name the technique which is used to visualize the' lateral movement of lipids ?

(A) FRAP. (B) Microscopy.

(C) Electrophoresis. (D) Spectrometry.

14. What is the name of the hollow sphere formed by lipid bilayer ?

(A) Cholesterol. (B) Lipid raft.

(C) Micelle. (D) Liposomes.

15. Genetic information stored in mRNA is translated to polypeptide by ———.

(A) Ribosome. (B) Nucleus.

(C) Endoplasmic reticulum. (D) Golgi apparatus.

16. Name those bacteria which obtain energy from chemical compounds ?

(A) Chemotrophs. (B) Phototrophs.

(C) Organotrophs. (D) Heterotrophs.

17. Which of the following cell is a multipotent cell ?

(A) T-cell. (B) B-cell.

(C) HSC cell. (D) Monocytes.

18. What is the origin of B-cell ?

(A) Pancreas (B) Liver.

(C) Thymus (D) Bone marrow.

19. Which of these features are not of chlorophyll ?

(A) It has Mg^{2+} as the central metal ion.

(B) It has cyclopentanone ring fused with a pyrrole ring.

(C) It has a planer tetrapyrrole ring structure.

(D) It is water-soluble pigment.

20. Circular DNA used for cloning is called ———.

(A) DNA polymerase. (B) RNA polymerase.

(C) Phagosome. (D) Plasmid.

21. Which of the following is NOT the characteristics of the plasmid?

(A) Replicate independently in a host cell.

(B) Selectable marker gene.

(C) Contain single cloning site.

(D) Small in size.

22. Name the vector system used for plant transformation?

(A) Agrobacterium. (B) Cosmids.

(C) M13 phage. (D) Resistance plasmid.

23. Which of the following is not a fat-soluble vitamin ?

(A) Vitamin D. (B) Vitamin K.

(C) Vitamin C. (D) Vitamin A.

24. Name the disease caused by the deficiency of Niacin ?

(A) Pellagra. (B) Rickets.

(C) Scurvy. (D) Pernicious anemia.

25. Which of the following vitamin is also known as cobalamin ?

(A) Vitamin B11. (B) Vitamin B12.

(C) Vitamin B6. (D) Vitamin B2.

26. What is an allele ?

(A) Characteristics of an organism.

(B) Alternate forms of genes.

(C) Homologous chromosomes.

(D) Pair of centrioles.

27. Out of the following, which law is also known as the law of purity of gametes ?

(A) Law of co-dominance.

(B) Law of independent assortment.

(C) Law of segregation.

(D) Law of dominance.

28. Which among the following is not an ammonia-oxidizing bacteria ?

(A) Nitrospina gracilis. (B) Nitrosococcus oceanus.

(C) Nitrosomonas europaea. (D) Nitrosovibrio tenuis.

29. Which of the following microorganism have two nuclei ?

(A) Slime molds. (B) Cyanobacteria.

(C) Paramecium. (D) Amoeba.

30. Which of the following is not true for chromatin ?

(A) Organized structure of DNA and protein.

(B) These are highly condensed DNA.

(C) It is found in the nucleus.

(D) It contains a single dsDNA.

31. Which of the following is responsible for B-cell activation ?

(A) Infection. (B) Antibody.

(C) Antigen. (D) Allergy.

32. Hybridoma technology is used to produce ————.

(A) Interferons. (B) Monoclonal antibodies.

(C) Antibodies. (D) Immune response.

33. Chlamydomonas is ——

(A) Green algae. (B) Red algae.

(C) Brown algae. (D) Lichens.

34. What is a mode of replication in E.coli ?

(A) Intermediate. (B) Dispersive.

(C) Conservative. (D) Semiconservative.

35. Name the enzyme which degrades DNA molecule by breaking its phosphodiester bonds ?

(A) DNA polymerase. (B) Nucleases.

(C) Ligase. (D) Reverse transcriptase.

36. Which of the following type of restriction enzyme does not require ATP for cleavage ?

(A) Type I. (B) Type II.

(C) Type III. (D) Type IV.

37. Name the organisms that manufacture organic compounds from simple inorganic compounds without using sunlight ?

(A) Chemotrophs. (B) Organotrophs.

(C) Phototrophs. (D) Detrivores.

38. Damage and errors in DNA cause ————.

(A) Mutation. (B) DNA repair.

(C) Translation. (D) Transcription.

39. Name the type of mutation in which the cause of mutation is not known ?

(A) Spontaneous mutation. (B) Suppressor mutation.

(C) Nonsense mutation. (D) Mis-sense mutation.

40. Which of the following protein does not involve in the initiation of replication ?

(A) DnaA

(B) SSB (Single strand binding protein).

(C) DnaB.

(D) Dna F.

41. The site of aerobic respiration in eukaryotic cells is ————.

(A) Peroxisome. (B) Plastid.

C) Mitochondria. (D) Cilia.

42. Chrysolaminarin is the reserved food of ————.

(A) Bacillariophycophyta. (B) Xanthophycophyta.

(C) Chlorophycophyta. (D) Phaeophycophyta.

43. Vaccination was invented by ————.

(A) Watson. (B) Jenner.

(C) Crick. (D) Pasteur.

44. Which of the following inhibits DNA replication ?

(A) *x*-rays. (B) Gamma rays.

(C) UV light. (D) Cathode rays.

45. Acridine orange is which type of mutagen ?

(A) Chemical compounds. (B) Transposons.

(C) Base analogue. (D) Intercalating agents.

46. Which part of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed ?

(A) Condenser lens. (B) Magnifying lens.

(C) Objective lens. (D) Eyepiece lens.

47. Name the structure which is used to transfer macromolecules between the cytoplasm and nucleus ?

(A) Microtubules. (B) Nuclear pores.

(C) Cilia. (D) Centrioles.

48. The principal microorganism for yogurt is ———.

(A) Leuconostoc citrovorum.

(B) Streptococcus lactis.

(C) Streptococcus thermophilus.

(D) Lactobacillus acidophilus.

49. The greatest resolution in light microscopy can be obtained with ———.

(A) Shortest wavelength of visible light used.

(B) Longest wavelength of visible light used.

(C) An objective with minimum numerical aperture.

(D) Shortest wavelength of visible light used and an objective with the maximum numerical aperture.

50. Which immunoglobulin can pass through placenta ?

(A) IgD. (B) IgE.

(C) IgM. (D) IgG.

(50 × 1 = 50 marks)

Part B

Answer any **ten** *questions.*

Each question carries 5 *marks.*

51. Describe recombinant DNA technology and its applications.

52. What is the role of *Agrobactevium tumefaciens* in plant transformation ?

53. Highlight the importance of the research and its necessity.

54. What is a polymerase chain reaction ? What are the steps involved ? Mention its applications.

55. Discuss the application of recombinant DNA technologies for human welfare.

56. Mention any *three* vector-less methods that are used to introduce recombinant DNA into a competent host cell.

57. Explain the process of DNA fingerprinting and its applications.

58. Explain the process of DNA replication in prokaryotic cells.

59. Discuss the main ideologies crucial in the biological control of diseases and pests.

60. Write briefly the importance of computer applications in research.

61. Explain the steps of the research process with examples.

62. What is ELISA ? Explain the principle involved in ELISA along with its various types.

63. What is the importance of a literature review in research ?

64. How to detect cancer ? What are a few approaches to treat cancer ?

(10 × 5 = 50 marks)